

APPLICATION FOR UNITED STATES PATENT

in the name of

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of

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for

Event-based Playlisting

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Event-based Playlisting

TECHNICAL FIELD

This invention relates to event processing, and more particularly to media events.

BACKGROUND

5 The sophistication level of electronic media distribution and administration is increasing rapidly. New devices and techniques are being used to meet the expanding reach of the electronic media and may use communications networks to distribute and/or select content.

SUMMARY

10 In one general sense, access to electronic media may be enabled by accessing a first track of electronic media, accessing a rule set, the rule set including an event definition describing an event condition to be monitored/detected during a current media state, and an event transition that relates the event definition to a new media state. The occurrence of the event in the rule set may be detected so that the event transition may be performed in response detecting to the event.

15 For example, accessing the rule set may include downloading a rule set from a host. A media player may be invoked before downloading the rule set. Accessing the first track may require accessing the rule set before the content is rendered. Performing the event transition may include accessing a second track, the second track relating to the new media state described in the event transition. Accessing the second track may include accessing an instantiation of the first track encoded at a different bit rate. Accessing the first track may include referencing a location for the electronic media.

20 Accessing the rule set with the event definition may include accessing a code segment describing a media player event for a media player accessing the electronic media that was not configured to process prior to accessing the rule set.

25 Accessing the rule set with the event definition and performing the event transition may include accessing the event definition that relates to an interruption in a network service while accessing the first track, and responding to the network interruption in response. Accessing the rule set with the event definition and performing the event transition may

include accessing the event definition that relates to an availability of a prioritized media selection that is now available and notifying the user as to the availability of the prioritized media selection. Accessing the rule set with the event definition and performing the event transition may include accessing an event condition within the event definition that describes a playlist that is used to select content, and using the playlist to select content.

Accessing the rule set with the event definition and performing the event transition may include accessing an event condition within the event definition that describes a licensing restriction and selecting content that complies with the licensing restriction. Accessing the rule set with the event definition and performing the event transition may include accessing an event condition within the event definition that enables an emergency broadcast system to interrupt the first track, and switching to a transmission of the emergency broadcast system.

An event condition may be accessed within the rule set that is commonly used across a type of media. The event definition may be used when the type of media is being used, so as to perform the event transition when the event associated with the type of media occurs. Accessing an event condition related to the type of media, using the event definition, and performing the event transition may include using a rule set that relates to video, audio, or data visualization.

An event condition may be accessed that is commonly used across a particular class of content or a theme. The event definition may be used when the particular class of content or the theme is being used so as to perform the event transition when the event associated with the type of particular class of content or the theme occurs.

Detecting that the event in the rule set has occurred may include determining that access to the first track has been interrupted. Detecting that the event in the rule set has occurred may include receiving state information from a communications interface.

DESCRIPTION OF DRAWINGS

Fig. 1 is a block diagram of a communications system capable of providing a client access to hosted electronic media.

Fig. 2 is a block diagram of a communications system that illustrates an implementation of a host configuration that enables client access to electronic media.

Fig. 3 illustrates a rule set that may be employed to regulate client access to hosted electronic media.

Fig. 4 is a flow chart illustrating a process that may be used by a client in accessing electronic media.

5 Fig. 5 is a flow chart illustrating a process that may be used by a client in responding to different events that may occur incident to accessing electronic media.

DETAILED DESCRIPTION

Generally, service providers seek to provide the highest quality experience for users accessing “New Media”- that is, media digitally encoded and available on the Internet. To
 10 provide the highest quality experience, a service provider may take measures that reduce the likelihood of an outage, which degrades the user experience. Similarly, a service provider may enable a client to act dynamically to respond to present and future events to present the best user experience. By enabling the client to act dynamically, a service provider may empower the client to respond to conditions that a service provider may be unable to detect.

15 Specifically, access to electronic media may be enabled by initially enabling a client to access a first track of electronic media. The client downloads a rule set that includes an event definition for an event that may occur, and a transition that relates the event definition to a new media state to be accessed when the event in the rule set occurs. The client may detect that an event described by an event definition in the rule set has occurred, and access a
 20 second track in response to detecting the event.

For example, a client may access an Internet radio station and download a rule set provided by the Internet radio station. The rule set may include an event definition set that describes one or more criteria for a network failure and how the client should respond when the criteria are met. The client then may subsequently detect that there is a network failure,
 25 such as an underrun condition, and access a lower bit rate version of the Internet radio station in response.

Fig. 1 illustrates a communications system 100 enabling a client to access electronic media. The media-based communications system 100 includes a client 110, a network 120, and a host 130. Although the communications system 100 is shown as a network-based
 30 system, the system may access media files residing in a standalone device or in a different

configuration. For example, a mobile jukebox may play content in the form of music encoded in a media file format.

Each of the client 110 and the host 130 may be implemented by, for example, a general-purpose computer capable of responding to and executing instructions in a defined manner, a personal computer, a special-purpose computer, a workstation, a server, a device, a component, other equipment or some combination thereof capable of responding to and executing instructions. The client 110 may be configured to receive instructions from, for example, a software application, a program, a piece of code, a device, a computer, a computer system, or a combination thereof, which independently or collectively direct operations, as described herein. The instructions may be embodied permanently or temporarily in any type of machine, component, equipment, storage medium, or propagated signal that is capable of being delivered to the client 110 or the host 130.

The client 110 may include one or more devices capable of accessing content on the host 130. The host client 110 may include a general-purpose computer (e.g., a personal computer (PC)) capable of responding to and executing instructions in a defined manner, a workstation, a notebook computer, a PDA ("Personal Digital Assistant"), a wireless phone, a component, other equipment, or some combination of these items that is capable of responding to and executing instructions.

In one implementation, the client 110 includes one or more information retrieval software applications (e.g., a browser, a mail application, an instant messaging client, an Internet service provider client, a media player, or an AOL TV or other integrated client) capable of receiving one or more data units. The information retrieval applications may run on a general-purpose operating system and a hardware platform that includes a general-purpose processor and specialized hardware for graphics, communications and/or other capabilities. In another implementation, the client 110 may include a wireless telephone running a micro-browser application on a reduced operating system with general purpose and specialized hardware capable of operating in mobile environments.

The client 110 may include one or more media applications. For example, the client 110 may include a software application that enables the client 110 to receive and display an audio or video data stream. The media applications may include controls that enable a user to configure the user's media environment. For example, if the media application is

receiving an Internet radio station, the media application may include controls that enable the user to select an Internet radio station, for example, through the use of “preset” icons indicating the station genre (e.g., country) or a favorite. In another example, the controls may enable the user to rewind or fast-forward a received media stream. For example, if a user does not care for a track on a particular station, the user may interface with a “next track” control that will queue up another track (e.g., another song).

The network 120 may include hardware and/or software capable of enabling direct or indirect communications between the client 110 and the host 130. As such, the network 120 may include a direct link between the client and the host, or it may include one or more networks or subnetworks between them (not shown). Each network or subnetwork may include, for example, a wired or wireless data pathway capable of carrying and receiving data. Examples of the delivery network include the Internet, the World Wide Web, a WAN (“Wide Area Network”), a LAN (“Local Area Network”), analog or digital wired and wireless telephone networks, radio, television, cable, satellite, and/or any other delivery mechanism for carrying data.

Generally, the host 130 includes one or more devices configured to distribute digital content. For instance, a host 130 typically includes a collection or library of content for distribution. Alternatively, or in addition, the host 130 may convert a media source (e.g., a video or audio feed) into a first feed of data units for transmission across the network 120. The host 130 also may include an input/output (I/O) device (e.g., video and audio input and conversion capability), and peripheral equipment such as a communications card or device (e.g., a modem or a network adapter) for exchanging data with the network 120.

The host 130 may include a general-purpose computer having a central processor unit (CPU), and memory/storage devices that store data and various programs such as an operating system and one or more application programs. Other examples of a content source 110 include a workstation, a server, a special purpose device or component, a broadcast system, other equipment, or some combination thereof capable of responding to and executing instructions in a defined manner.

The host 130 may include playlisting software configured to manage the distribution of content. The playlisting software organizes or enables access to content by a user community. For example, the host 130 may be operated by an Internet radio station that is

supporting a user community by streaming an audio signal, and may arrange a sequence of songs accessed by the user community.

Referring to Fig. 2, a communications system 200 is shown that enables a client 110 to access electronic media, and process the first track in accordance with the downloaded rule set. For convenience, particular components and messaging formats described earlier are referenced as performing the process. However, similar methodologies may be applied in other implementations where different components are used to define the structure of the system, or where the functionality is distributed differently among the components shown.

Generally, the client 110 and the network 120 relate to the client 110 and the network 120 described previously in Fig. 1. Thus, the client 110 may include a personal computer accessing the Internet to access the host 130.

The host 130 generally includes systems enabling a client to access a first track of content, download a rule set that includes an event definition and an event transition, detect that the event in the rule set has occurred, and access a second track in response to detecting the event. As shown in Fig. 2, the host 130 includes a management agent 132, a content source 134, a duplicating switch 134A and a rule set provider 136.

Generally, the management agent 132 includes one or more devices configured to provider user and security services for the host 130. In one implementation, the management agent 132 is configured to set client permissions and access rights. Thus, a client 110 wishing to access an Internet-radio station may be initially authenticated using the management agent 132. The management agent 132 then may correlate an identifier for a user of the client (e.g., a screen name) and identify which services the client is allowed to access. For example, a client 110 may be allowed to access basic Internet radio stations that are encoded at a lower quality bit rate, and not be allowed to access premium stations that are encoded at a higher bit rate.

The management agent 132 may selectively enable access to content by providing the list of one or more content sources (e.g., content source 134) after the client 110 has been authenticated and/or by setting permissions on the content source 132 after the client 110 has been authenticated.

Generally, the content source 134 includes a system configured to provide one or more tracks of content to the client 110. For example, the content source 134 may include a

server running streaming server software that responds to streaming requests sent from clients. The content source 134 may be configured to provide multiple tracks of content within a stream that is transmitted to the client 110. For example, an Internet radio station may transmit a sequence of songs to a client as part of transmitting an IP ("Internet Protocol") stream.

The content source 134 need not arrange the tracks. For example, the content source 134 may be configured to enable access to a track requested by a user. Thus, the client 110 may be configured to arrange a playlist, and request one or more tracks as required.

The content source may include a duplicating switch 134A. Generally, a duplicating switch 134A includes a device that performs network operations and functions in hardware (e.g., in a chip or part of chip). In some implementations, the duplicating switch 134A may include an ASIC ("Application Specific Integrated Circuit") implementing network operations logic directly on a chip (e.g., logical gates fabricated on a silicon wafer and then manufactured into a chip). For example, an ASIC chip may perform filtering by receiving a packet, examining the IP address of the received packet, and filtering based on the IP address by implementing a logical gate structure in silicon.

Implementations of the device included in the duplicating switch may employ a Field Programmable Gate Array (FPGA). A FPGA is generally defined as including a chip or chips fabricated to allow a third party designer to implement a variety of logical designs on the chip. For example, a third party designer may load a FPGA with a design to replace the received IP addresses with different IP addresses, or may load the FPGA with a design to segment and reassemble IP packets as they are modified while being transmitted through different networks.

Implementations of the device included in the duplicating switch also may employ a network processor. A network processor is generally defined to include a chip or chips that allow software to specify which network operations will be performed. A network processor may perform a variety of operations. One example of a network processor may include several interconnected RISC ("Reduced Instruction Set Computer") processors fabricated in a network processor chip. The network processor chip may implement software to change an IP address of an IP packet on some of the RISC processors. Other RISC processors in the

network processor may implement software that monitors which terminals are receiving an IP stream.

Although various examples of network operations were defined with respect to the different devices, each of the devices tends to be programmable and capable of performing the operations of the other devices. For example, the FPGA device is described as the device
5 used to replace IP addresses and segment and reassemble packets. However, a network processor and ASIC are generally capable of performing the same operations.

The duplicating switch 134A may include an event circuit configured to determine whether an event described by an event definition has occurred. For example, the duplicating
10 switch may include an SNMP (Simple Network Management Protocol) collection agent that monitors a network state. The event circuit may analyze the network state and determine whether one or more events have occurred for one or more clients. When the event has occurred, the event circuit may generate a message or modify a stream of data units transmitted to the client indicating that the event has occurred. For example, the event circuit
15 may be configured to modify IP packets transmitted to the client indicating that network utilization is excessive. In response to receiving an IP packet so modified, the client may initiate an event transition for the event. For example, the client may use a lower bit rate or an alternate content source.

The rule set provider 136 includes a system configured to provide a rule set to a client
20 110. For example, when a client 110 is authenticated (e.g., using management agent 132), the client 110 may receive a rule set that is pushed from the rule set provider 136 in response to a message received from the management agent 132. Alternatively, the rule set provider 136 may be configured to receive requests from the client 110.

Generally, a rule set includes an event definition and an event transition. The event
25 definition describes an event that may occur during a current media state, that is, while a first track is being accessed. In one example, the event definition describes a network condition or failure. Other examples of events described in an event definition may include, but are not limited to, content rules, licensing rules, and client rules. Generally, a content rule describes an event related to the underlying content in the track being accessed. The licensing rules
30 may regulate how a track is accessed relative to other related tracks. For example, the licensing rules may preclude the same song or artist from being played back-to-back or in a

specified frequency within a specified period of time. The client rules relate to operating the client 110 within a specified performance range. Thus, a media player application may be controlled so that the media player application does not cause adverse performance for other applications on the client 110.

Referring to Fig. 3, an exemplary rule set 300 is shown. For convenience, particular components and messaging formats described earlier are referenced as performing the process. However, similar methodologies may be applied in other implementations where different components are used to define the structure of the system, or where the functionality is distributed differently among the components shown.

The rule set 300 includes network rules 310, content rules 320, licensing rules 330, and client rules 340. Generally, the network rules 310 includes event definitions that describe one or more events relating to network conditions that may adversely impact a client's ability to access a track. As shown, the network rules 310 include event definitions for underrun condition 1, underrun condition 2, and for when network access interrupted. The network rules 310 include corresponding transitions to use a lower bit rate when underrun condition 1 occurs, switch to an audio only version when underrun condition 2 occurs, and play locally stored content when network access is interrupted.

For example, underrun condition 1 may correspond to a minor intermittent failure condition that occurs in receiving a track. Such a condition may result from operating a communications link, such as a dial up link, near maximum capacity. The rule set may instruct the client 110 to access a lower bit rate stream, for example, by accessing a twenty kilobits-per-second stream instead of a forty kilobit per second stream. The underrun condition 2 may correspond to a more severe condition. For example, the client 110 may be receiving a video stream that has an unsupportable bandwidth requirement. As a result, the rule set may instruct the client 110 to receive an audio-only version of the track that consumes less bandwidth. Finally, access to the client 110 network may be interrupted. In response to interrupted network access, the rule set may instruct the client 110 to play locally stored content.

The content rules 320 generally instruct a client 110 how to operate using event definitions and transitions related to the content being accessed. For example, if a country ballad (a slower selection) is being played, a "fast country" selection may be played next.

Similarly, if the song included in lyrics that are inappropriate for children is being played, the next track may be selected. Finally, the rule set may relate to a mood-based playlisting system, where tracks are accessed to create and/or preserve a specified mood. Accordingly, if the mood for a current track is uplifting, the next track accessed may be selected so that the uplifting mood is preserved.

The licensing rules 330 relate to licensing restrictions associated with being granted permission to use and distribute one or more forms of electronic media. Thus, if a track associated with an artist is played twice in an hour, or the same track is selected twice within three hours, or an album is accessed twice in two hours, the rule set may provide a transition that instructs the client to access a different track of content that complies with the licensing rules.

The client rules 340 include event definitions and transitions configured to operate the client in a specified operating range. For example, the rule set may be structured to control a media player so that it does not adversely impact other user applications on the client 110. In the example shown, the client rules 340 include an event definition for an application failure (first time), an application failure (second time), and a memory failure. In response to these events, the application may be reset (when there was a first time application failure), a trusted content source may be accessed (when there was a second time application failure), or the client may transition to a format that uses less memory (when there was a memory failure). Specifically, for example, the application may be reset to eliminate an abnormal condition that was introduced, or trusted content source may be accessed to avoid errors that may be introduced by a particular content source or format. Thus, the rule set may instruct a media player to use a content source operated by a service provider instead of continuing to use a content source operated by a third party. Similarly, the rule set may instruct the media player to use a more widely adopted format, rather than use a newly released format.

Moreover, the client rules 340 may instruct the client 110 to use a different format that uses less memory. For example, the client rules 340 may instruct the client 110 to use a more efficient compression algorithm. Using the more efficient compression algorithm may reduce an amount of memory required to store an instance of the first selection.

Referring to Fig. 4, a flow chart 400 illustrates an exemplary process by which a client 110 may access electronic media using a rule set to control the client 110. For

convenience, particular components and messaging formats described earlier are referenced as performing the process. However, similar methodologies may be applied in other implementations where different components are used to define the structure of the system, or where the functionality is distributed differently among the components shown.

5 Initially, a client 110 accesses a first track of electronic media (410). For example, a client 110 may retrieve a stream from a duplicating switch enabling access to an Internet Radio station. Accessing a first track may not include actually playing or generating output using the first track. Rather, accessing the first track of content may include receiving a playlist of digitally encoded audio tracks. The playlist may include the actual content to be
10 played, or it may include one or more references to subsequently access content (e.g., a URL to access a song on the Internet).

 The host 130 provides access to the first track of electronic media (420). In one example, the host 130 provides access to the first track on a track-by-track basis. Alternatively, the host 130 may enable access to a stream hosted on a duplicating switch, and
15 insert additional tracks in the stream as required.

 The client 110 downloads a rule set with an event definition and event transition (430). Accessing a rule set may include retrieving information describing one or more events and transitions relating to how a client 110 responds when one of the events occurs. The rule set may include, but is not limited to, the rules described previously with respect to Figs. 1-3.

20 Accessing the rule set may include retrieving the rule set using both in-band and out-of-band information. For example, retrieving the rule set using out-of-band information may include accessing a rule set from a host 130 in a separate download operation than the download operation enabling access to one or more tracks. Alternatively, an in-band rule set may be written to metadata that is included in the track exchanged with the client 110. Thus,
25 the rule set is accessed in the same download operation used to access the track.

 The client 110 continues to access the first track (440). For example, the client 110 may “play” the first track, or additional tracks in the playlist. During the first track, or during a subsequent track, the client 110 may determine that an event in the rule set has occurred (450). This may include, for example, determining that a network failure has occurred. In
30 response to detecting the event, the client 110 accesses a second track (460). The host 130 then provides the second track (470).

Referring to Fig. 5, a flow chart 500 illustrates an exemplary process by which a host may enable access to electronic media. For convenience, particular components and messaging formats described earlier are referenced as performing the process. However, similar methodologies may be applied in other implementations where different components are used to define the structure of the system, or where the functionality is distributed differently among the components shown.

Initially, the client 110 accesses a first track of audio (505). The host 130 provides the first track of audio (510). The client 110 downloads a rule set that includes an event definition and an event transition (515), and continues to access the first track of audio (520). The client 110 detects that an event described in the event definition has occurred (e.g., a network underrun has occurred) (525). In response, the client 110 accesses a second track of audio, which in this case is a lower bit rate version of the audio track that was selected (530). The host 130 provides a second track of audio (535). The client 110 accesses the second and third track of audio (540). The client 110 determines that the second and third tracks have the same artist, which violates a licensing rule (545). In response, the host 140 provides a fourth track of audio that does not violate the licensing rule (550). The client 110 accesses the fourth and fifth track of audio (555). The client 110 determines that the fourth and fifth tracks of audio have inconsistent moods, violating a client rule provided for by an event definition in the rule set (560). In response and as indicated by the transition associated with the client rule, the client 110 provides a sixth track of audio that provides a consistent mood, which the client accesses (565).

Other implementations are within the scope of the following claims. For example, accessing a track need not include outputting the track. A track may be accessed in advance of playing the track. Thus, a user playlist may include metadata that describes the content that will be played in the future using the playlist. The metadata may include URL (“Uniform Resource Locator”) information enabling the client 110 to retrieve the track. The metadata also may include lyrics to a song, parental control information, mood-state information, and artist and album information. The metadata may be analyzed using the rule set. Based on the analysis performed, the playlist may be modified to comply with the rule set. Thus, if the analyzing the playlist reveals that licensing restrictions may be violated, the playlist may be modified to comply with applicable licensing rules.

The rule set may include rules personalized to a user, or common across a community of one or more users. The rule set may be used for more than one track, or listening session.

The rule set may be modified or updated over time to reflect changes to the rule set. For example, the host may monitor one or more client activities and provide updates to the rule sets that are responsive to the activities. For example, the host 130 may determine that the client is consistently experiencing the same failure associated with a particular content source. In response, the host 130 may provide the client 110 with one or more alternative content sources and instructions that remove the particular content source associated with the failures from the list of content sources.

The rule set 110 may allow the client 110 to create its own playlist. This may provide a user experience that the user is accessing their own personal radio station. For example, the rule set may include a list of URLs and modifiers enabling the client 110 to retrieve different selections of content. The modifiers may be used to access different tracks on a content source. The client 110 then may assemble a sequence of tracks (some of which may include commercials or advertisements). By presenting a sequence of tracks with periodic commercials, local news, and traffic information, the user receives their own personal radio station. The rule set may include one or more personalization tags enabling the client 110 to assemble content responsive to a predicted interest by a user.

The client 110 may update their own rule set. For example, the client 110 may store information describing which tracks the user has accessed. The client 110 may use this stored information to comply with one or more licensing rules.

The rule set may be configured to provide live updates or prioritized content. For example, the rule set may include a notification event where a client may receive notification of prioritized media content or actually receive the prioritized media content when the content becomes available. The rule set may allow a polling agent to poll a host to determine when prioritized content is available. Alternatively, the client may receive a message or learn from the polling agent that prioritized media content is available, which may include a transmission of the Emergency Broadcast System, a current highlight from a favorite sports team or player (e.g., a touchdown run in a football game), or an availability of a user's preferred content (e.g., a live concert with a favorite artist).

In one implementation, the rule set provides an address or location from which the prioritized media content may be made available, or where a polling agent may monitor for updates. In another implementation, the rule set may relate to a client a messaging code segment where the client may receive notifications of live events.

5 The rule set may include notifications that allow the user to configure which prioritized media content a user elects to receive. For example, a rule set may be configured to provide live transmissions of the Emergency Broadcast System and allow live video updates of a favorite baseball player and football team. The live video updates may be provided automatically, or a user may be notified as to the availability of the live update and
10 select whether to receive the live update.

 The rule set and operations may be distributed across multiple devices. For example, an event defining a first condition (e.g., a network interruption) may be defined on a media player on a client. The client then may download or access an event transition for the first condition (e.g., identifying which content source to access in the event of a network
15 interruption). In another example, the first condition may be defined in a media player, but the parameter describing the network condition (e.g., more than a specified number of underruns) may be downloaded from a host. Still yet another example may include a media player where the event condition resides on a client and a host (e.g., where the media player includes an event for an underrun and the host defines network performance representing an
20 underrun) and the event transition resides on the host.

 A host enabling access to content or client software may require a rule set to be in place and/or accessed (e.g., used/downloaded) before the content may be provided or rendered. Thus, a client attempting to access an Internet Radio Station may be required to download a rule set regulating how a stream from the Internet Radio Station is processed.

25 The rule set operations may be used for other purposes, in addition or to the exclusion of enabling a client to act dynamically. For example, the rule set may be used in a number of different circumstances and environments, such allowing a device to operate in a standalone or static configuration.